



The Introduction and Commercialization of West Indian Avocados to Fairchild Tropical Botanic Garden Living Collection, South Florida

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The avocado (*Persea americana* Miller) is an important fruit crop for subsistence farmers, small- and large-scale producers, throughout the tropics. In the lowlands of Tropical America, local selections of West Indian avocados dominate regional markets. These local West Indian avocado selections are often of superior fruit quality and adaptation to the climatic and edaphic conditions of the area. There has been little effort into the systematic identification, collection and maintenance of these West Indian avocado genetic resources from Tropical America. West Indian avocado selections have promise for South Florida as cultivars for plantation and estate agriculture. Working with local collaborators we have identified superior selections within localized areas of diversity, collected budwood and established a living collection at the Fairchild Farm Genetic Resource Center of Fairchild Tropical Botanic Gardens in South Florida. More than 200 different selections of West Indian Avocado were collected during four years. As a genetic resource, these selections hold promise for the improvement of disease resistance (e.g. *Phytophthora* root rot), fruit quality and productivity of avocado throughout Tropical America and the world. Evaluation of fruit and tree characteristics began in 2005 and we have now identified several green- and red-skinned cultivars with promise for commercial and landscape use in Florida and in Tropical America, Africa, and Asia.

West Indian avocados are prevalent throughout the lowlands of Tropical America. Naturalized seedlings occur in suitable habitats, particularly in association with human activity, along roadsides, or as remnant trees left after the clearing of forests. Our efforts have concentrated on superior selections of West Indian avocados in the patio gardens, and small orchards of Costa Rica, the Dominican Republic, Nicaragua, El Salvador, Guatemala, Panama, and Puerto Rico.

Materials and Methods

The identification and location of these selections was based on past field experience with the avocado in Tropical America and the identification of localized centers of diversity. Travel reports, diaries, and the personal experiences of field horticulturists from Fairchild Tropical Botanic Garden, the United States Department of Agriculture (USDA) and private growers/collaborators offered a starting point in the location of superior genetic resources. However, to locate specific superior trees across such extensive regions we have relied most heavily on local collaborators within each region. Collaborators are a diverse group made up of local growers and hobbyists, university, and non-governmental organization employees.

The expeditions for collecting started in 2002. By 2006, two-hundred individual selections were collected. Each individual selection was collected as budwood to maintain the clone. Veneer or cleft grafts were used on 'Waldin' rootstocks. The imported material was subjected to a one-year post-entry quarantine, following the USDA-APHIS regulations for entry into the United States. The new selections were planted as a single tree replicate in a permanent living collection at the Fairchild Farm Facility in

South Florida and managed under a typical commercial avocado maintenance program for South Florida. The selections were screened for the presence of the sunblotch viroid at the time of establishment in the field. Trees have been under evaluation from 2005–13. Tree growth habit, fruit quality, and productivity have been the focus of research. Fruit characteristics, size, color flesh, color skin, °Brix, and other desirable characteristics for commercial purposes were evaluated.

The introduction of improved selections or clones of new West Indian avocado and the identification of suitable economic potential and commercial development protocols for their propagation will allow for the development of these potential resources for the modern avocado industry.

Results and Discussion

Nearly a century ago in South Florida, West Indian avocados hybridized with Guatemalan varieties, giving rise to cultivars with superior commercial traits and allowed the Florida avocado industry to thrive. The avocado industry is an important fruit tree crop to the agricultural economy of Florida. Florida contributes 9% of the United States national production with 100% of West Indian avocados. There are growing concerns among Florida growers and industry representatives about the future of this important crop in the region.

For the current collecting effort in Tropical America we have targeted West Indian race avocado selections (Fig. 1). Selection criteria include heavy production, multiple cropping, superior fruit size and quality, a small seed and to a lesser extent potential as a rootstock.

Table 1 contains a summary of the superior avocado selections during the evaluations from 2005–13. Based on these evaluations we identified new selections with economic potential for modern

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Fig. 1. New selections of West Indian Avocado—(A) ‘Derna Fuente’; (B) ‘Yucatan 2’; (C) ‘Talapeño’; and (D) ‘Vainilla’.

Table 1. Superior avocado selections and economic potential: evaluations from 2005–13.

Cultivar	Provenance	Fruit shape/color	Fruit wt (g)	Economic Potential
Blass	Costa Rica	Oval/black	650	Niche market: exceptional quality, unique appearance.
Butler	Puerto Rico	Oval/dark green	730	Modern production model: fresh fruit productive
Catalina	Cuba	Elongated/ light green	920	Modern production model: fresh fruit productive
Derna Fuentes	Nicaragua	Oval/black	910	Modern production model: fresh fruit highly productive, moderate peeling, smooth texture, deep yellow flesh
Don Bacho	Guatemala	Oval/black	356	Niche market: fruit is very attractive, easy to peel, smooth texture
Edwin	Costa Rica	Oblong/light green	620	Potential: rootstock/salt and disease tolerance
Retalhuleu	Guatemala	Oblong to elongated/ dark green	887	Modern production model: fresh fruit productive, smooth texture
Talpeño	El Salvador	Oval-oblong/ black greenish	610	Niche market: productive, easy to peel, no air cavity by the seed, smooth texture, light yellow
Utuaado	Puerto Rico	Oval/dark green	560	Modern production model: fresh fruit highly productive
Vainilla	Guatemala	Oblong/dark red	610	Niche market: distinctive color
Wilson Popenoe	Puerto Rico	Oblong/ light yellow-green	1088	Niche market: easy to peel, some space in seed, very smooth texture, light yellow
Yucatan 2	Guatemala	Oval/lightgreen	1100	Niche market: long and slender seed shape, easy to peel, no air cavity by the seed, deep yellow flesh

production. ‘Derna Fuentes’, ‘Butler’, ‘Catalina’, ‘Retalhuleu’, and ‘Utuaado’ are the most promising ones for commercial production. ‘Don Bacho’, ‘Blass’, ‘Yucatan 2’, and ‘Wilson Popenoe’ have promise for niche markets due to the distinctive overall appearance and characteristics. ‘Edwin’ shows potential as a rootstock with salt and disease tolerance. It is necessary to continue with these evaluations for more years. A few of the selections have been collected from flooded soils near the sea. These selections may be of interest for root rot resistance, but no assessment was made of the presence of the root rot pathogen in the soils.

There are no other regional, national, or international collections that are conserving West Indian avocado for genetic diver-

sity. The diversity of these new genetic resources will continue under evaluation to determine season of production and potential for improvement of disease resistance (e.g. *Phytophthora* root rot).

There is concern about a new disease of avocado called ‘laural wilt’, which is vectored by the redbay ambrosia beetle. This disease has the potential to destroy the avocado industry in South Florida. Our avocado collection is located in the area of dispersion of the disease, but so far we have had no reports of symptoms. We will use stock from our collection to select for resistance to this devastating disease.